

14th October

CAR-T cell therapy UPSC Syllabus: Prelims

Sub Theme: Biotechnology (S&T)|UPSC

Context: The Indian firm ImmunoACT has received approval from the **Central Drugs Standard Control Organization** for its **CAR-T cell therapy** NexCAR19. The therapy is the first of its kind to be developed in India and will be used to treat certain types of cancers like **B-cell lymphomas and leukaemia** (blood cancer).

Q1. Consider the following statements with reference to the CAR T-cell therapy:

1. The therapy involves directly activating the patient's immune system against cancer.
2. The treatment is more than 90% effective against all types of known cancers.
3. The therapy does not have any known side effects.

How many of the statements given above are correct?

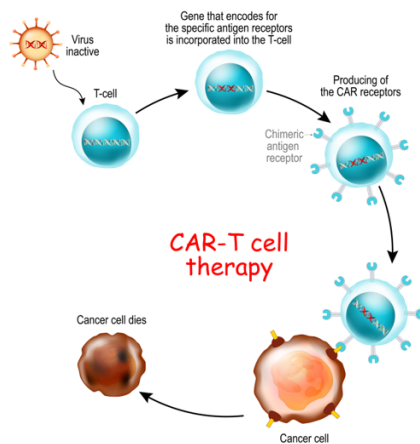
(a) Only one (b) Only two (c) All three (d) None

Answer: (a)

Explanation:

Basic background:

- Chimeric antigen receptor (CAR) T-cell therapy is a type of **cell-based gene therapy** which involves **altering the genes inside T cells** (a type of white blood cell) to help them attack cancer cells.
 - o In the therapy, **T-cells** are harvested from the patient's blood.
 - o Researchers modify these cells in the laboratory so that they **express specific proteins on their surface** known as **chimeric antigen receptors (CAR)**.
 - o These cells are then grown and multiplied in the laboratory and then inserted back into the patient.
 - o This genetic modification **allows CAR T-cells to effectively bind to the cancer cells** and destroy them.



- **Statement 1 is correct:** In **CAR T-cell therapy**, the **immune system is activated** when the **modified T-cells are reintroduced into the body**, which allows a sustained killing of cancer cells.
 - o As CAR-T cells **directly activate the patient's immune system against cancer**, it makes the treatment more clinically effective than surgery, Radiotherapy and Chemotherapy.
- **Statement 2 is incorrect:** Presently, CAR T-cell therapy has been approved for **leukaemia** (cancer arising from the cells that produce white blood cells) and **lymphoma** (arising from the lymphatic system). For these cancers, the efficacy of the treatment is as high as **90%**, whereas, in other types of cancers, it is significantly **lower**.
- **Statement 3 is incorrect:** The treatment has potential side effects:
 - o High fever
 - o Trouble breathing
 - o Severe nausea, vomiting
 - o Muscle and/or joint pain

- o **Neurological symptoms** like severe confusion, seizures, and speech impairment.

UPSC PYQ 2021

Q. With reference to recent developments regarding 'Recombinant Vector Vaccines', consider the following statements:

1. Genetic engineering is applied in the development of these vaccines.
2. Bacteria and viruses are used as vectors.

Which of the statements given above is/are correct?

- (a) 1 only
- (b) 2 only
- (c) Both 1 and 2
- (d) Neither 1 nor 2

Answer: (c)

Semiconductor Manufacturing

UPSC Syllabus: Mains Sub Theme: Economy | UPSC

Semiconductor Manufacturing in India

What are Semiconductors?

- Semiconductors are materials which have a conductivity between conductors and insulators. Semiconductors can be pure elements, such as silicon or germanium, or compounds such as gallium arsenide or cadmium selenide.
- A semiconductor chip is a network of semiconductors, also called integrated circuits or microchips.
- End-use industries dependent on semiconductors include mobile devices, telecom equipment, industrial machinery, computing devices, automobiles etc.

Global Semiconductor Scenario:

- The semiconductor chip-making process is complex and requires high precision and technological expertise. Manufacturing processes have multiple steps in the supply chain such as designing software for chips and patenting them through core Intellectual Property (IP) rights.
- The global semiconductor industry is currently valued at \$500-\$600 billion.
- The chip-making industry is a highly-concentrated one, with the big players being Taiwan, South Korea and the U.S. among others.
- **Major Producer:** Presently, Taiwan is the world leader in manufacturing microchips with producing over 60% of the world's semiconductors and over 90% of the most advanced ones.
- Globally, the entire value chain has seeped in the interdependence between a handful of countries like the USA, Taiwan, Japan, China, and some European nations.
- However, this value chain has witnessed two key disruptions in the last few years.
- **US-China Conflict:** Presently, USA and China are engaged in trade and technology conflict.
 - o The USA passed the CHIPS and Science Act, providing subsidies for manufacturing chips in the country, formed the "Chip 4 Alliance" and imposed additional restrictions on the Chinese semiconductor industry.
 - o In a similar manner, China put curbs on the exports of germanium and gallium, two niche metals used in the manufacturing of semiconductors.
- **Covid-19 Pandemic:** Lockdowns disrupted the functioning of these semiconductor manufacturing units and its forward & backward linked supply chains. This created a demand-supply mismatch and resulted in long-pending orders with end-use industries.

India's Role:

India has positioned itself as a player in the critical semiconductor technology field providing an opportunity for companies to diversify their bases from China.

- **Market Size:** Reports project India's semiconductor market to value about \$64 billion by 2026, showing three-times growth from 2019. According to the India Electronics and Semiconductor Association (IESA), semiconductor consumption in India is growing at a rate of 15.1%.
- **Chip Design:** India has become the hub for semiconductor design with nearly 2,000 chips being designed per year.
- **R&D in the industry:** Research and development (R&D) in this industry, which includes electronic products and embedded systems, generated about US\$2.5 billion in revenue.
- However, 100% of our chips, memory, and display are imported into the country, 37% coming from China. Chips import bill is estimated to touch \$100 billion by 2025 from \$24 billion now.
- India can be a major beneficiary of Taiwan's New Southbound Policy, focusing on shifting its trade and investments from China to Southeast Asia and South Asia.

Policies for Semiconductor Manufacturing

- **National Policy on Electronics 2019:** It envisions positioning India as a global hub for Electronics System Design and Manufacturing (ESDM) sector. It aims to encourage the development of core components, including chipsets.
- **Scheme for Promotion of Manufacturing of Electronic Components and Semiconductors (SPECS):** The government will provide a financial incentive of 25% on capital expenditure for a list of products that constitute the supply chain of electronic products. This includes products such as electronic components, semiconductors, and specialized sub-assemblies.
- India launched its **India Semiconductor Mission (ISM)** in 2021 and **Production Linked Incentive (PLI)** scheme for the semiconductor industry.
- About Modified Semicon India Programme:
 - The Ministry of Electronics and Information Technology (MeitY) has launched the Semicon India programme for the development of a sustainable semiconductor and display ecosystem in 2021.
 - Objective: It aims to provide attractive incentive support to companies/consortia that are engaged in Silicon Semiconductor Fabs, Display Fabs, Compound Semiconductors, Semiconductor Design (Design Linked Incentive Scheme for nurturing 100 domestic companies of semiconductor design) etc.
 - Tenure: Support under the scheme will be provided for six years.
 - Nodal Agency: India Semiconductor Mission, within Digital India Corporation, MeitY is the designated nodal agency for implementing the programme.
- In 2022, India signed **India-US Initiative on Critical and Emerging Technologies (iCET) deal** which enables India to access technologies associated with manufacturing of high-end semiconductors and chipsets.

Significance of semiconductor industry for India

- **Economic and Industrial Growth**
 - According to the Electronics and IT Ministry, semiconductor demand in India would increase to \$70-\$80 billion by 2026 with the growing demand for digital devices and electronic products (mobiles & laptops etc).
 - Development of the semiconductor and display ecosystem will have a multiplier effect across different sectors of the economy with deeper integration to the global value chain.
 - Indigenous manufacturing of chips will build its smartphone assembly industry and strengthen its electronics supply chain.
 - This will create numerous employment opportunities for the Indian youth.
 - Further, India would be required to import fewer semiconductor chips which would decrease the import bill. Production of semiconductors in surplus of domestic requirement will enable the country to meet export demand as well.
- **National Security:** Semiconductors are essential components in many critical industries, including defense, telecommunications, power transmission etc that have implications for national security. Chips made locally will be designated as "trusted sources" and can be used in products ranging from CCTV cameras to 5G equipment.
- **Geopolitical Benefits:** Self-sufficiency will decrease reliance on Chinese chip imports especially during hard times like the recent Galwan Valley border clash. The

program will attract large global chip makers to make India their production base, fulfilling the government's vision for Atmanirbhar Bharat.

- **Supply Chain Resilience:** The COVID-19 pandemic highlighted the vulnerabilities of global supply chains, including those in the semiconductor industry. Governments are encouraging domestic semiconductor manufacturing to increase supply chain resilience and reduce dependence on foreign suppliers. The pandemic and the subsequent lockdowns impacted the supply of chips to India. Automobile manufacturers like Mahindra & Mahindra and Tata group were compelled to reduce their production due to the shortage.
- **Technological Leadership:** Semiconductors are the building blocks of today's technology. Semiconductor chips are widely used in (a) Computers and laptops; (b) Phones, mobile devices and other electronic gadgets; (c) Automobiles; (d) Aviation; (e) Medical devices especially diagnostics; (f) Military equipment among others. These semiconductor chips are the drivers for ICT (Information and Communication Technologies). Semiconductors and displays are the foundation of modern electronics driving the next phase of digital transformation under Industry 4.0.

Challenges/constraints in India

- **High Cost of establishment:** Fabs are highly capital-intensive undertakings, costing billions of dollars for large facilities. As per a government estimate, it would cost roughly \$5-\$7 billion to set up a chip fabrication unit in India.
- **Infrastructural requirements:** There are often challenges in meeting the infrastructural requirements of a cluster of semiconductor manufacturing fabs such as continuous supply of water, uninterrupted electricity etc.
- **Long gestation:** A state-of-the-art fab can take up to five years before going into full production but requires full financing and continuous supply of labour during the gestation period.
- **Delays in setting up facilities:** Three entities that had applied to build the chips are all facing hurdles in setting up their plants – potentially delaying their manufacturing bases.
- **Shortage of skilled workforce:** There are hardly any semiconductor engineers trained in the knowledge of device physics and process technology.
- **Need for the ecosystem:** Beyond locating and building structures, fabs require a variety of high-purity gases and wafers to fabricate the chips. Presently, India has to import many of these raw materials from external sources.

Way Forward

- **Ecosystem Development:** Develop a strong ecosystem for the semiconductor industry to include supply chain management besides design and manufacturing facilities.
- **Skill Development:** India, with its demographic dividend, must focus on training the highly skilled labour required for the semiconductor industry.
- **Increased focus on R&D:** Increase spending on research and development and develops an innovation culture.
- **Incentivising Industry:** There is a need for incentivising industry to collaborate with academia to provide training and internship opportunities to students and invest in R&D to develop new technologies.
- **Partnership:** Strengthen partnerships with countries such as the USA, Taiwan and Japan for supply chain efficiency and availability of necessary raw materials and technologies.
- **Attracting foreign companies:** India needs to enable a conducive environment for attracting foreign companies to set up their manufacturing bases in India.

Medical Termination of Pregnancy Act 1971

UPSC Syllabus: Mains Sub Theme: Social Justice | UPSC

SC urges woman to rethink plea to end 26-week pregnancy.

#GS2 Rights issue, #Gender Issues #Women & Women issues

Context:

Recently, a three-judge bench of the Supreme Court has urged a married woman to reconsider her decision to abort her pregnancy which has crossed **twenty-six** weeks.

Background:

- Medical termination of pregnancy in India is governed by **Medical Termination of Pregnancy Act 1971**.

- **Section 3 of MTP Act** deals with the **termination clause**, the pregnancy can be terminated if:
 - Length of pregnancy does not exceed **twenty weeks** (requires opinion of **one practitioner**) or
 - **Twenty to twenty-four weeks** (requires opinion of **at least two practitioners**) that:
 - (i) Continuance of pregnancy would involve life risk for the pregnant woman or of grave injury to her physical or mental health.
 - (ii) Or if the child were born, it would suffer from serious physical or mental abnormalities.
- **Beyond 24 weeks** if the termination is recommended by a **Medical Board** after diagnosis of **substantial fetal abnormalities**.

Issues with respect to the time frame (twenty-six weeks) for termination of pregnancy:

- **Women's right to reproductive choices** is part of 'personal liberty' under **Article 21** of Constitution as observed in **Suchita Srivastava vs Chandigarh administration** case.
- **Socio-economic and mental health condition:** In **XYZ v. Maharashtra**, a minor was allowed to terminate her pregnancy in 26th week after considering her **socio-economic and mental health condition**.
- **Right to privacy:** In **KS Puttaswami** case, SC held that right to privacy enables individual to retain and exercise autonomy over body and mind.
- **Laws in over 60 countries allow** women to get an abortion on request **at any point in the gestation period**.
- **Rights of unborn child:** State also has to think about the rights of unborn child, there is an ethical dilemma to strike a balance between the **rights of mother and rights of unborn child**.

Critical appraisal:

- **Unsafe and illegal abortions:** As per a lancet study in 2018, there are around 16 million abortions accessed in India, 73% of which were medicated abortions accessed outside health facilities.
- **Shortage of doctors:** MoH&FW 2019-20 report on Rural Health Statistics indicates that there is a 70% shortage of obstetrician-gynecologists in rural India, pushing women for illegal abortions and high maternal mortality.
- Since law does not permit **abortion at will**, it pushes women towards illicit and unsafe conditions.
- **Lack of comprehensive sex education:** In India, lack of sex education contributes to unplanned pregnancies, and the MTP Act alone is not enough to address this issue.
- **Sex-selective abortions:** There is need to strike a balance between female reproductive rights keeping in mind that the rights do not lead to increased female feticide.

Way forward:

- In India, where sex selective abortions are prevalent, the state needs to be watchful of anything that might be adversarial for efforts against female feticide.
- There is a need for increasing awareness and information dissemination with respect to responsible sexual conduct and reducing unwanted pregnancies.
- State must ensure that all parts of society are able to access contraceptives to avoid unintended pregnancies.
- Medical facilities and Registered Medical Practitioners must be present in each district and are affordable to all.
- Treatment must not be denied based on one's caste or other socio-economic factors.

Prelims MCQ:

Q. Consider the following conditions regarding Medical Termination of Pregnancy Act, 1971.

1. Risk to the woman's life.
2. Physical or mental abnormalities in the fetus.
3. Grave injury to physical or mental health of woman.
4. Rape or incest.

How many of the above are the conditions under which an abortion can be legally performed up to 24 weeks of gestation under the MTP Act?

- (a) Only one
- (b) Only two
- (c) only three
- (d) All four

Answer: **(d) All four.**

Explanation: The MTP Act allows for abortions up to 24 weeks of gestation in cases of risk to the woman's life, physical or mental abnormalities in the fetus, Grave injury to physical or mental health of woman, and in cases of rape or incest.

Insight

Biohydrogen and India's green hydrogen pathway

GS Paper 3 Syllabus: Environment Conservation Source: [DTE](#)

Context: The article discusses the role of biohydrogen in India's green hydrogen pathway. It also discusses the industrial interest in biogas reforming, which converts biogas into environmentally friendly chemicals like syngas or bio-hydrogen.

The key difference between biohydrogen and green hydrogen is in their sources of production:

- **Biohydrogen:** Derived from biological sources such as biogas, and often considered a form of renewable hydrogen due to its environmentally friendly conversion process.
 - Biohydrogen is hydrogen produced from biological sources, typically through biogas reforming. It converts biogas (CH₄ and CO₂) into hydrogen, often referred to as syngas or bio-hydrogen
- **Green Hydrogen:** Produced through the electrolysis of water using renewable energy sources like solar or wind power, and is considered the purest form of clean hydrogen.

Definition of Green Hydrogen:

In August 2023, the Union Ministry of New & Renewable Energy, Government of India, provided a definition for green hydrogen, specifying it as having a well-to-gate emission (encompassing water treatment, electrolysis, gas purification, drying and compression of hydrogen) not exceeding 2 kg CO₂ equivalent per kg H₂. In contrast, grey hydrogen, on average, emits 10 kg of CO₂ per kg of H₂ produced.

Nodal Agency: The Bureau of Energy Efficiency (BEE) (under the Union Ministry of Power) is the nodal authority responsible for accrediting agencies for monitoring, verifying and certifying green hydrogen production projects.

Challenges in Green Hydrogen Production:

Not Sufficient	Green hydrogen constitutes less than 1 per cent of the world's hydrogen production and usage (as per the Global Hydrogen Review 2023 by the International Energy Agency (IEA))
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Green hydrogen production needs to grow significantly to align with Net Zero Emissions goals.

Energy inefficient	30% of renewable energy is lost while producing hydrogen
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Carbon emissions.	Existing methods involve fossil fuels with high carbon emissions.
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Low Adoption	Low-emission hydrogen adoption in various sectors is slow.
Economic Sustainability	Low economic sustainability of extracting green hydrogen.
	For transportation fuel cells, hydrogen must be cost-competitive with conventional fuels and technologies on a per-mile basis
Access to critical minerals	Access to critical minerals such as nickel, platinum group metals and rare earth metals such as lanthanum, yttrium and zirconium could hinder scaling up electrolyser manufacturing capability in India

Biohydrogen as a Promising Solution:

Challenge	How Biohydrogen Addresses It
Source Diversity	Utilizes biogas as a readily available source, offering diversity in raw materials for hydrogen production.
Environmental Benefits	Converts methane and CO2 in biogas into hydrogen, reducing harmful emissions and promoting a more sustainable process.
Cost-Effective	Biogas-based hydrogen production is often cost-effective, making it a practical solution for green hydrogen.
	It is cost-effective mainly due to the similarity between biogas and natural gas
Carbon Capture	The biohydrogen process inherently captures carbon from biogas, contributing to carbon-neutral or even carbon-negative outcomes.
	Biogas reforming can help reduce carbon deposition through the use of excess steam
Infrastructure Compatibility	Biohydrogen production methods can be integrated with existing natural gas infrastructure, minimizing the need for new infrastructure development.
Research and Development	Attracts significant research interest and investment, driving innovation in the field of biohydrogen production.

Government Initiatives for Bio and Green Hydrogen:

Initiative	Key Points
Global Biofuel Alliance	Leading efforts to establish global standards for hydrogen from biomass.
National Hydrogen Mission	Targeting a production increase to 5 million metric tonnes (MMT) by 2030, meeting 40% of domestic requirements.
Production Linked Incentive (PLI) Scheme	Proposing a Rs 15,000-crore PLI scheme for electrolysers.
Green Hydrogen Mission	Development of Green Hydrogen Production Capacity of at least 5 MMT (Million Metric Tonne) per annum; Renewable energy capacity addition of about 125 GW in the country by 2030
	Strategic Interventions for Green Hydrogen Transition (SIGHT): Funding domestic electrolyser manufacturing and green hydrogen production.
	Green Hydrogen Hubs: Identifying and developing states/regions for large-scale hydrogen production/utilization.
	Strategic Hydrogen Innovation Partnership (SHIP): Under this Public-private partnership framework R&D will be facilitated under the mission.
International Collaboration	Actively partnering with other countries, research institutions, and private entities for expertise and technology development.
Renewable Energy Integration	Integrating green hydrogen production with India's expanding renewable energy capacity for improved efficiency and sustainability.

India’s status for Green Hydrogen:

- Oil India Limited (OIL) recently commissioned India’s first 99% pure green hydrogen plant in eastern Assam’s Jorhat

- NTPC (in Kawai, Surat) has started India's 1st Green Hydrogen Blending operation in the Piped Natural Gas (PNG) Network.
- The Petroleum and Natural Gas Regulatory Board (PNGRB) has given approval for a 5% blending of green hydrogen with PNG (later to be scaled to 20%)
- Pune Municipal Corporation (PMC) has collaborated with business management consultant
- The Green Billions (TGBL) to manage its waste and generate it into useable green hydrogen (under the waste-to-hydrogen project)
- Strategic Clean Energy Partnership (SCEP) to mobilise finance and speed up green energy development

Way forward

- Investment in R&D on green Hydrogen technology is required.
- There is a need to announce incentives to convince enough users of industrial hydrogen to adopt green hydrogen.
- India needs to develop supply chains in the form of pipelines, tankers, intermediate storage and last-leg distribution networks.
- Need to establish an end-to-end electrolyser manufacturing facility.
- Need a manufacturing strategy that integrates with the global value chain and can maximize existing strengths.

Conclusion

Bio-hydrogen will be a critical industrial fuel of the 21st century. India is well-positioned to show leadership, which is in India's and the planet's collective interest.

Mains Links: What are the key features of the National Clean Air Programme (NCAP) initiated by the Government of India? (UPSC 2020)

Ethical Values Shown by NCF for School Education 2023

GS Paper 4 Syllabus: Ethical Values in Personal Lives Source: LM

The National Curriculum Framework for School Education 2023 emphasizes the importance of inculcating values in education.

It articulates five 'Aims of Education':

Aim of Education	Description

1. Rational Thought and Independent Thinking	Fostering critical thinking, problem-solving, and independent inquiry among students.
2. Health and Well-being	Promoting physical and mental well-being, including awareness of health and hygiene.
3. Democratic and Community Participation	Encouraging active participation in a democratic society, understanding community engagement.
4. Economic Participation	Preparing students for economic roles and employment opportunities.
5. Cultural Participation	Promoting an understanding of cultural diversity and heritage, encouraging cultural engagement.

Values categorized in the framework are:

Category	Values
Ethical and Moral Values	1. Empathy
	2. Sensitivity
	3. Integrity

	4. Courage
Democratic Values	1. Commitment to Liberty
	2. Commitment to Equality
	3. Embracing Diversity
	4. Fraternal Spirit
	5. Social Responsibility
Epistemic Values (it refers to the virtues associated with the pursuit of knowledge and truth)	1. Scientific Temper
	2. Recognizing Sources of Knowledge
	in Different Domains

How these values can be developed?

Method	Description
Classroom Discussions	Regular discussions in the classroom to foster values
Sports and Activities	Engagement in sports and activities to develop virtues
Curricular Content	Inclusion of stories and historical events that promote values

Role Models	Positive role models in school culture and practices
Age-Appropriate Approaches	Tailored strategies for different age groups
Moral and Ethical Course	Introduction of specific courses to address values
Dialogue and Empathy	schools need to manage conflicts in values, like disparities between school-taught values and those practiced in communities by deploying dialogue and empathetic actions
Teacher and Community Influence	The behaviour of teachers, principals, and the community plays a significant role
Non-Judgmental Assessment	Assessment through observation of behaviour rather than judgment
Curriculum Development	Development of engaging teaching materials
Constitutional Understanding	Discussions on constitutional values and duties

Conclusion:

Despite these efforts, it is more important to enable students to understand and apply complex moral and ethical reasoning in real-world scenarios, so the focus must be on the application of these ethical principles in the [NCF 2023](#) in day-to-day life.

Mains Links:

“Education is not an injunction; it is an effective and pervasive tool for all-round development of an individual and social transformation.” Examine the New Education Policy, 2020 (NEP, 2020) in light of the above statement. (UPSC 2020)

Naik Yeshwant Ghadge

Content for Mains Enrichment

Source: IE

Naik Yeshwant Ghadge was an Indian war hero who served during World War II's Italian campaign (1943-45). He epitomizes the forgotten Indian heroes of the war.

Ghadge, at the age of 23, single-handedly captured an enemy post in Montone, Italy. He was posthumously awarded the Victoria Cross, Britain's highest military honour.

Indian soldiers, part of the British Indian Army, contributed over 2.5 million troops to the Allied war effort, with about 50,000 participating in the Italian campaign.

Usage: The example shows values of Bravery, Duty and Sacrifice, Valour, and Service

Mesolithic rock art find adds to Hyderabad's history

Facts for Prelims (FFP)Source: TH

Context: A significant archaeological discovery was made in the Manchirevula Forest Trek Park near Hyderabad.

- Ancient rock paintings that appear to date back to the Mesolithic period.
- The paintings, which are in red pigment, depict three tortoises, a fish, and a geometric motif.
- The paintings are approximately 6,000 to 12,000 years old, placing them within the Mesolithic era, which spans from 10,000 to 4,000 BC.
- The site is well-preserved due to its covered nature, and there are plans to create a protective fence and clear a path for visitors to view the art while ensuring its conservation.

Prehistoric rock paintings:

The term 'Prehistory' refers to the distant past when there was no paper or language, and hence painting and drawing were the oldest art forms practised by human beings to express themselves, using the cave walls as their canvas. The first discovery of rock paintings was made in India in 1867–68 by an archaeologist, Archibold Carlleyle, twelve years before the discovery of Altamira in Spain.

Period	Upper Paleolithic (40000 – 10000 BC)	Mesolithic (10000 – 4000 BC)	Mesolithic Rock Painting
Paintings	Linear representations of animal and human figures	Smaller in size with hunting scenes predominating	Made with natural white kaolin and red ochre pigments
Prominent Locations	Vindhya ranges of Madhya Pradesh, Uttar Pradesh	Langhnaj (Gujarat), Bhimbetka, Adamgarh	Guntur

Themes	Daily life events to sacred and royal images	The naturalistic style for animals, stylistic for humans	Depicts social life and culture, man tilling the land
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Royalty rates for three critical and strategic minerals

Facts for Prelims (FFP)Source: PIB

Context: The Union Cabinet approved amendments to the Mines and Minerals (Development and Regulation) Act, 1957, specifying royalty rates for three critical and strategic minerals: Lithium, Niobium, and Rare Earth Elements (REEs).

What are Royalty rates?

Royalty rates are fees paid to the government for the extraction of minerals or resources from a specified area. 2nd Schedule of MMDRA 1957 deals with the royalty rates of minerals.

These minerals were delisted from atomic minerals and can now be auctioned to the private sector. The approved royalty rates are as follows:

- Lithium (3% of London Metal Exchange price)
- Niobium (3% of Average Sale Price)
- REEs (1% of the Average Sale Price of Rare Earth Oxide)

If not specified, the royalty rate for minerals is 12% of the Average Sale Price (ASP).

Significance of fixing Royalty Rates: Encouraging indigenous mining of these minerals is crucial for reducing imports, boosting mining sector investment, promoting economic development, and supporting India's energy transition and national security. The move is also expected to create job opportunities in the mining sector.

Initiatives for Critical Minerals exploration:

Initiative	Details
Amendment to MMRDA	Amendment to MMRDA in 2023 delisted six minerals, including Lithium and Niobium, from the list of atomic minerals, thereby allowing private sector participation
	Provided for the auction of mining leases and composite licenses of 24 critical and strategic minerals by the central government
Khanij Bidesh India Ltd	It is a government joint venture that aims to secure critical minerals globally, with a focus on Australia and South America.

Presently, India's mineral royalty rates are among the highest in the world, thus impacting the competitiveness of the sector and putting an economic burden on mining companies.

About the Minerals:

Mineral	Description	Common Uses
Lithium	An alkali metal used in rechargeable batteries for mobiles, laptops, electric vehicles, and medical devices like pacemakers.	Rechargeable batteries, energy storage.
Rare Earth Elements	A group of 17-odd minerals including scandium, yttrium, cerium, and more.	Catalysts, magnets, alloys, glass, electronics, petroleum extraction, electric motors, wind turbines.
Niobium	A silvery metal with a corrosion-resistant oxide layer on its surface. The main source of Niobium is the mineral columbite, which is found in countries such as Canada, Brazil, Australia, and Nigeria.	Alloys (stainless steel), jet engines, construction materials, superconducting magnets (particle accelerators, MRI scanners).

Protocol for Management of Malnutrition in Children

Context: The Indian government has introduced a national protocol called the ‘Protocol for Management of Malnutrition in Children’ aimed at identifying and providing comprehensive care for malnourished children in the country. The protocol was launched by the Union Minister for Women and Child Development.

Features:

- It outlines a 10-step process for identifying and managing malnutrition in children at the Anganwadi level, incorporating aspects such as growth monitoring, appetite testing, nutritional management, and follow-up care.
- The protocol also introduces innovative approaches, such as the “Buddy mother” concept, where a mother with a healthy child guides the mother of a malnourished child at an Anganwadi centre.
- This initiative is part of the government’s efforts to combat malnutrition through the ‘Poshan Abhiyan,’ with a focus on treating malnourished children and promoting their healthy growth.

UN General Assembly elects 15 new members to the Human Rights Council

Standard

Context: Russia is facing a challenging battle to regain a seat on the United Nations Human Rights Council.

- Russia is competed against Albania and Bulgaria for two seats in the East European regional group.
- The United States and other nations have been actively campaigning against Russia’s re-election, citing concerns about its human rights record, including alleged war crimes in Ukraine.
- Human Rights Watch has also criticized Russia and China, stating that they are unfit to serve on the council due to their ongoing human rights abuses.
- By secret ballot, the Assembly elected Albania, Brazil, Bulgaria, Burundi, China, Côte d’Ivoire, Cuba, Dominican Republic, France, Ghana, Indonesia, Japan, Kuwait, Malawi and the Netherlands. All 15 members will serve three-year terms beginning on 1 January 2024

The United Nations Human Rights Council (UNHRC) is an intergovernmental body that promotes and protects human rights around the world.

Resilient and Inclusive Supply-chain Enhancement (RISE) initiative

The Print

Context: The World Bank and Japan, have launched the Resilient and Inclusive Supply-chain Enhancement (RISE) initiative in Morocco.

- This initiative is designed to tackle the dual challenges of job creation and climate change by aiding emerging markets and developing countries in expanding their clean-energy product manufacturing and increasing their participation in the minerals industry.
- The initiative aims to stimulate economic growth and generate local employment opportunities, ultimately contributing to poverty reduction.
- This collaborative effort emphasizes the importance of international cooperation in promoting economic growth in these countries while strengthening clean energy and critical minerals supply chains.

ICRISAT Joins One CGIAR Initiative

(FFP) Source: HBL

The International Crops Research Institute for the Semi-Arid Tropics (ICRISAT) has joined the One CGIAR (Consultative Group on International Agricultural Research) integrated partnership.

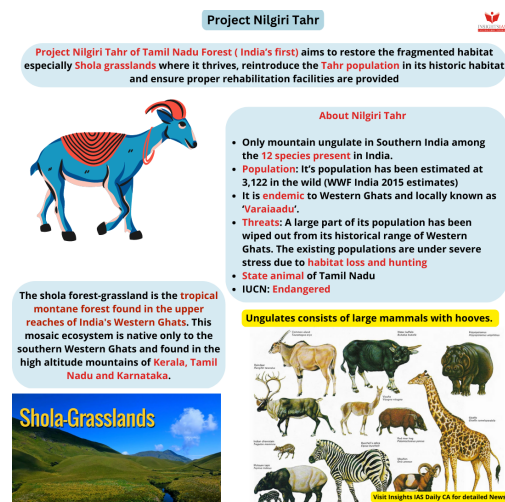
This partnership involves the CGIAR System Organization and 12 One CGIAR research centres (including ICRISAT), aiming to unify efforts in transforming food, land, and water systems to address the challenges posed by the climate crisis.

CGIAR (est. 1971; founder: Forrest F Hill) is a network of publicly-funded agri-food systems research centres. It aims to reduce rural poverty, increase food security, improve human health and nutrition, and sustainable management of natural resources.

About ICRISAT The International Crops Research Institute for the Semi-Arid Tropics (ICRISAT) (HQ: Patancheru, Hyderabad; founded 1972 with support from the Ford and Rockefeller foundations) is an international organization that conducts agricultural research for rural development. It has regional centres in Mali and Kenya, along with research stations in several African countries. ICRISAT operates under the charters of the FAO and UNDP. It holds a special status as a UN organization in India, granting it certain immunities and tax privileges.

Project Nilgiri Tahr Facts for Prelims (FFP) Source: TH

Context: Tamil Nadu has launched 'Project Nilgiri Tahr,' a wildlife conservation initiative. The project aims to protect the endangered Nilgiri Tahr, a species native to the Western Ghats. It focuses on understanding the population, distribution, and ecology of Nilgiri Tahr, reintroducing them to their historical habitats, addressing immediate threats to their survival, raising public awareness, and developing eco-tourism activities.



Mapping Source: TH Context: The row over the UK's Rosebank oil field revolves

around the British government's approval of a major oil and gas project in the North Sea. This decision has sparked Environmental Concerns (contradictory to the UK's commitment to achieving net-zero carbon emissions by 2050)

The Rosebank oil field, located northwest of the Shetland Islands, is a significant untapped reserve with the potential to produce 300 million barrels of oil. It's expected to contribute 8% of the UK's total oil production and generate jobs until 2051.

The North Sea lies between Great Britain, Denmark, Norway, Germany, the Netherlands, Belgium and France. An epeiric sea (on the continental plate and having a very low depth avg. of 90m) on the European continental shelf, it connects to the Atlantic Ocean through the English Channel in the south and the Norwegian Sea in the north.



Byjus

Category: INTERNATIONAL RELATIONS

1. Israel tells Palestinians to leave northern Gaza

Syllabus: Effect of policies and politics of developed and developing countries on India's interests

Prelims: Places in news – Gaza

Mains: Israel – Palestinians conflict

Context: Israel has issued an unprecedented evacuation order to one million Palestinians in northern Gaza. This order precedes an expected ground invasion against Hamas, who launched attacks against Israel. The United Nations has expressed concern about the potential calamitous impact of mass exodus.

Present Issues:

- Humanitarian Crisis in Gaza:**
 - Israel has imposed a total siege on Gaza, cutting off essential supplies, food and water, and causing a blackout.
 - Civilians and aid workers are fleeing from Israeli airstrikes, leaving them in dire conditions.
- Hamas' Response:**
 - Hamas has dismissed the evacuation order as a ploy, calling on people to stay in their homes.
 - They have been responsible for thousands of rocket attacks on Israel.
- Hostage Situation:**
 - Hamas took 150 people hostage during their recent attack on southern Israel.
 - Israel has demanded the release of the hostages before allowing any supplies into Gaza.
- Casualties:**
 - The conflict has resulted in over 3,000 deaths on both sides, escalating tensions in the region.

Impact:

- The crisis in Gaza has far-reaching implications for regional stability and the lives of civilians trapped in the conflict.
- The evacuation order, the siege, and the hostage situation have brought the situation to a critical juncture.

Way forward:

- Immediate Humanitarian Aid:**
 - International organizations and countries should work to provide immediate humanitarian assistance to the people of Gaza.
 - Efforts should be made to ensure the delivery of essential supplies, including food, water, and medical aid.
- Negotiation and Ceasefire:**
 - Diplomatic efforts should be intensified to broker a ceasefire and facilitate negotiations between Israel and Hamas.
 - The release of hostages and the restoration of essential services must be prioritized.
- International Mediation:**
 - The United Nations and other international bodies should play a more active role in mediating the conflict and ensuring compliance with international humanitarian law.
- Long-term Resolution:**
 - A comprehensive, long-term solution to the Israeli-Palestinian conflict is essential to prevent further crises in the region.

Nut Graf: The crisis in Gaza, marked by Israel's evacuation order, the siege, and the hostage situation, has created a dire humanitarian situation. Immediate action is needed to provide aid, negotiate a ceasefire, and seek a lasting resolution to the conflict to prevent further loss of life and suffering. The international community must step in to mitigate the ongoing crisis and work toward a peaceful and sustainable future in the region.

2. 'West Asia conflict will not affect IMEC'

Syllabus: Effect of policies and politics of developed and developing countries on India's interests Mains: Challenges to IMEC

Context: Finance Minister Nirmala Sitharaman addressed concerns about the impact of the West Asia conflict on the India-Middle East-Europe Economic Corridor (IMEC).

- The conflict between Israel and Palestine has raised fears related to fuel prices, food security, and supply chain disruptions.

- The Finance Minister assured that IMEC plans remain unaffected and discussed the issue at the G20 Finance Ministers and Central Bank Governors (FMCBG) meeting in Marrakech.

The Corridor

- The India-Middle East-Europe Economic Corridor (IMEC) Project was signed at the [G20](#) Summit in New Delhi.
- The project forms part of the Partnership for Global Infrastructure and Investment (PGII). PGII is a values-driven, high-impact, and transparent infrastructure partnership to meet the enormous infrastructure needs of low and middle-income countries.
- The proposed IMEC will consist of railroad, ship-to-rail networks and road transport routes extending across two corridors, that is,
 - The East Corridor – connecting India to the Arabian Gulf
 - The Northern Corridor – connecting the Gulf to Europe
- The IMEC corridor will also include an electricity cable, a hydrogen pipeline and a high-speed data cable.

Objective:

- It aims to create a comprehensive transportation network, comprising rail, road, and sea routes, connecting India, the Middle East, and Europe.
- It aims to enhance transportation efficiency, reduce costs, increase economic unity, generate employment, and lower Greenhouse Gas ([GHG](#)) emissions.
- It is expected to transform the integration of Asia, Europe, and the Middle East by facilitating trade and connectivity.

Significance:

- The India-Middle East-Europe Economic Corridor is a significant economic initiative that can have far-reaching implications for regional trade and economic development.
- The global concerns related to fuel and food security have broader implications for the stability of the global economy and the well-being of populations.

Solution:

- **IMEC Resilience:**
 - Efforts should be made to ensure the resilience of IMEC to external factors, including conflicts in the region.
 - Diversification of trade routes and supply sources can enhance the corridor's stability.
- **Global Coordination:**
 - The international community, including G20 nations, should work together to address concerns related to fuel and food security.
 - Collaborative efforts can help stabilize global markets and ensure the availability of essential commodities.
- **Economic Growth and Investment:**
 - While higher interest rates can impact investment flows in emerging markets, the Finance Minister emphasized the importance of recognizing these economies as growth engines.
 - Investment decisions should not be solely influenced by high-interest rates, as these markets offer substantial growth opportunities.

Nut Graf: The Finance Minister's assurance that the West Asia conflict will not affect IMEC is a positive sign for the continued development of this crucial

economic corridor. However, global concerns related to fuel and food security highlight the need for international cooperation to address potential disruptions and ensure the stability of global markets. Recognizing emerging markets as growth engines is essential for sustaining investment flows and economic growth.

C. GS 3 Related

Category: ECONOMY

1. Govt. mulls partnerships to make semiconductor chips

Syllabus: Economic Development in India

Prelims: Semiconductor features

Mains: Significance of manufacturing Semiconductor chips for India

Context: The Indian government is exploring various partnerships and initiatives in the fields of semiconductor chip manufacturing, [artificial intelligence](#) (AI), and robotics.

- Seven working groups have submitted recommendations for the Indian government's AI roadmap, which includes public-private partnerships for semiconductor production.
- The government also plans to create "GPU clusters" for AI applications and develop a diverse dataset platform for Indian researchers and startups.

Details:

- **Semiconductor Chip Production:**
 - India is considering partnerships to boost semiconductor chip manufacturing, a crucial component of modern technology.
 - The need for semiconductor chips is growing in various sectors, including AI and electronics.
- **AI Application and Dataset Platform:**
 - The government is focusing on AI applications in agriculture, healthcare, education, fintech, security, and governance.
 - A diverse dataset platform is planned to provide anonymized datasets for training AI models.
- **Robotics Strategy:**
 - The draft National Strategy on Robotics aims to leverage robotics technology for economic and industrial transformation.
 - It emphasizes the importance of manufacturing and local development of robotics hardware.

Significance:

- These initiatives are significant for India's technological and economic development, as they address emerging technologies and their applications across various sectors.
- They demonstrate a commitment to fostering innovation, research, and local manufacturing in the technology domain.

Way forward:

- **Semiconductor Manufacturing Partnerships:**
 - Collaborate with private sector companies to establish semiconductor manufacturing facilities in India, enhancing self-reliance in chip production.
- **AI and Dataset Platform:**
 - Encourage public-private partnerships to develop AI applications in key sectors.
 - Ensure the dataset platform adheres to data privacy and security standards.
- **Robotics Development:**
 - Implement fiscal incentives to promote local manufacturing of robotics hardware, fostering innovation and economic growth.
 - Establish demonstration facilities for testing and showcasing robotics technologies to potential investors and users.

- Invest in skill development and capacity building in the robotics sector to create a skilled workforce.
- Public Awareness and Perception:
 - Educate the public about the potential benefits of robotics, emphasizing the value of quality assessment and efficiency rather than focusing solely on job losses.

Nut Graf: The Indian government's initiatives in semiconductor manufacturing, AI, and robotics reflect a proactive approach to technology-driven growth. Collaborations with the private sector and the creation of diverse datasets can accelerate advancements in AI. Furthermore, the focus on robotics presents an opportunity to boost domestic manufacturing and enhance industrial competitiveness.

E. Editorials

Category: INTERNATIONAL RELATIONS

1. Balancing policy

Syllabus: GS-2, Effect of policies and politics of developed and developing countries on India's interests.

Mains: Balancing policy of India in the Israel and Palestine conflict

Context:

- India faces the challenge of maintaining a balanced and nuanced policy in the midst of the Israel-Palestine conflict.
- Recent events, including Hamas attacks on Israel and Israel's response, have put India's diplomacy to the test.
- India's historical support for the Palestinian cause and growing ties with Israel create a delicate diplomatic tightrope.

Issues:

- Diverse Interests and Concerns:
 - India faces a dual challenge of expressing solidarity with Israel in the face of terror while ensuring the safety of its citizens and remaining consistent on its Palestine policy.
 - Balancing its relationship with Israel, economic interests, and counter-terrorism cooperation with the need to condemn indiscriminate bombings and uphold international humanitarian law.
- Shift in Ties:
 - India's diplomatic ties with Israel, established in 1992, have strengthened, with close bilateral relations, trade, technology cooperation, and military procurement.
 - This shift towards Israel's position is a departure from its historical support for the Palestinian cause.
- Moral and Diplomatic Challenges:
 - India must condemn acts of terrorism, including those by Hamas, while not endorsing excessive military actions or policies that violate international law.
 - Israel's demand for Gaza residents to evacuate raises concerns about the impact on civilians.

Significance:

- India's approach to the Israel-Palestine conflict is significant in the context of its diplomatic relations, international positioning, and the need to balance moral values and strategic interests.

Solution:

- Steadfast Condemnation of Terrorism:
 - India should unequivocally condemn acts of terrorism, irrespective of the actor, while supporting international efforts to combat terrorism.
- Upholding International Humanitarian Law:
 - India can use its diplomatic influence to encourage Israel to adhere to international humanitarian law, ensuring the protection of civilians in conflict zones.
- Maintain Consistent Position on Palestine:

- India can reaffirm its long-standing support for the Palestinian cause, which remains a key aspect of its foreign policy.
- Engage in Diplomacy:
 - India should use its diplomatic channels to engage with both Israel and Palestine, urging peaceful solutions and advocating for dialogue.
- Support International Mediation:
 - India can endorse international efforts, including those by the United Nations, to mediate and facilitate a peaceful resolution to the Israel-Palestine conflict.

Nut Graf: India faces a complex task in balancing its foreign policy regarding the Israel-Palestine conflict. It must condemn terrorism, advocate for international humanitarian law, and maintain its commitment to the Palestinian cause. Engagement in diplomacy and support for international mediation are essential to navigate this delicate diplomatic tightrope. India's stance on this issue reflects its commitment to peace, stability, and the principles of international law.

F. Prelims Facts

1. Operation Ajay: India brings back 212 citizens from Israel in first flight

Context:

- India initiated Operation Ajay to bring back citizens from crisis-hit Israel in response to the escalating security situation following Hamas' attack on Israel.
- The first flight under this operation carried 212 citizens who had registered with the Embassy of India in Israel.

Details:

- Crisis in Israel:
 - The security situation in Israel deteriorated after Hamas' attack, leading to a volatile and dangerous environment for residents and foreign nationals.
 - The ongoing exchange of rockets and missiles between Israel and Hamas has added to the peril.
- Safety Concerns:
 - Indian citizens in Israel have faced fear and uncertainty, with the sound of air raid sirens and the threat of conflict haunting their daily lives.
 - The underground shelters constructed by the Israeli government have provided a measure of physical safety.
- Airlift Operation:
 - Operation Ajay is aimed at evacuating willing Indian citizens from Israel and ensuring their safe return to India.
 - The operation follows the principle of "not leaving any Indian behind," as emphasized by the External Affairs Minister.
- Significance:
 - Operation Ajay holds significant importance as it demonstrates the Indian government's commitment to the welfare and safety of its citizens, even in challenging and crisis-stricken situations.
 - It underlines India's responsiveness to its citizens' needs, particularly those residing abroad, during times of distress.

2. 'Govt. will not restrict but only monitor the import of laptops'

Context: The Indian government has clarified that it will not impose licensing requirements on the import of laptops and computers. Instead, it will focus on monitoring inbound shipments of these products, marking a change from the earlier announcement in August.

Details:

- Licensing Requirement Announcement:
 - In August, the Indian government had announced plans to subject laptops, tablets, computers, and related products to a licensing regime, effective from November 1.

- This decision aimed to boost domestic manufacturing and reduce imports from countries like China.
- Revised Approach – Monitoring:
 - The government's new approach involves monitoring, rather than imposing restrictions or licensing requirements, on laptop imports.
 - Commerce Secretary Sunil Barthwal clarified that the focus is on closely watching importers and their laptop shipments.
- Monitoring and Data Collection:
 - The decision to monitor laptop imports allows the government to collect data on the volume and sources of imported laptops.
 - This data can aid policymakers in making informed decisions and assessing the impact on domestic manufacturing.
- Balancing Domestic Production and Imports:
 - Striking a balance between promoting domestic industry and maintaining a competitive global market is crucial.
- Transparency and Stakeholder Engagement:
 - Ensure transparency in the monitoring process and engage with industry stakeholders to gather insights and feedback.
 - Collaboration with businesses and trade associations can help in crafting effective policies.
- Evaluating Impact:
 - Continuously evaluate the impact of the monitoring approach on the laptop and computer market in terms of domestic production, quality, and affordability.
 - Adjust policies as necessary to achieve the desired outcomes.

H. UPSC Prelims Practice Questions

Q1. The area known as 'Ramallah', which sometimes appears in the news, is located in

which region?

1. Gaza
2. West Bank
3. South Asia
4. Jordan

CHECK ANSWERS:-

Answer: b

Explanation: Ramallah is a small city in the West Bank region, located north of Jerusalem. It has acted as the de facto capital city of the Palestinian administration.

Q2. With reference to the issue of GPU clusters, which of the following statements

is/are incorrect?

1. GPU clusters consist of computers with a graphics processing unit (GPU) on every node.
2. Multiple GPUs in a cluster are primarily used for gaming performance.

Select the correct answer using the code given below:

1. 1 only
2. 2 only
3. Both 1 and 2
4. Neither 1 nor 2

CHECK ANSWERS:-

Answer: b

Explanation: GPU clusters are primarily used for specific computational tasks like image processing and machine learning, not gaming performance.

Q3. Consider the following pairs:

S.N o.	Operation	Objective
1.	Kaveri	Evacuation of Indians from Ukraine.

2.	Ganga	Evacuation of Indians from Sudan.
3.	Ajay	Evacuation of Indians from conflict-hit Israel.

How many pairs given above is/are correctly matched?

1. Only one pair
2. Only two pairs
3. All three pairs
4. None of the pairs

CHECK ANSWERS:-

Answer: a

Explanation: India initiated "Operation Ajay" to evacuate its citizens from Israel. Operation Kaveri was for evacuation from war-torn Sudan, and Operation Ganga was for evacuation from Ukraine.

Q4. With reference to the India-Middle East-Europe Economic Corridor (IMEC) Project,

which of the following statements is/are correct?

1. The IMEC Project was signed at the G20 Summit in New Delhi.
2. It aims to facilitate economic integration between Asia, the Arabian Gulf, and Africa.

Select the correct answer using the code given below:

1. 1 only
2. 2 only
3. Both 1 and 2
4. Neither 1 nor 2

CHECK ANSWERS:-

Answer: a

Explanation: IMEC is envisioned as a network of transport corridors, including railway lines and sea lanes, that is expected to aid economic growth through integration between Asia, the Arabian Gulf, and Europe.

Q5. What is the term used to define administrative procedures that require the submission

of an application or other documentation prior to the importation of goods?

1. Import licensing
2. Export licensing
3. Trade regulation
4. Customs clearance

CHECK ANSWERS:-

Answer: a

Explanation: Import licensing involves administrative procedures for imports, requiring documentation before goods can be imported.

iasbaba

Intensified Mission Indradhanush (IMI 5.0)

Syllabus Prelims –GOVERNMENT SCHEMES

Context: Intensified Mission Indradhanush (IMI 5.0), a campaign of the Union

Ministry of Health and Family Welfare will conclude all 3 rounds on 14th October 2023.

About Intensified Mission Indradhanush (IMI 5.0):-

- Launch: 2023.
- Ministry: Ministry of Health and Family Welfare.
- Objective: to enhance immunization coverage for all vaccines provided under the Universal Immunization Programme (UIP) as per the National Immunization Schedule (NIS).
- It is the flagship routine immunization campaign of the Union Ministry of Health and Family Welfare. ([Mission Indradhanush](#))

Salient Features:-

- The campaign will be conducted across the country during the months of August, September and October this year.
- During these three rounds, children of the 0-5 years age group and pregnant women, who have missed any dose of vaccine as per the National Immunization Schedule (NIS), will be vaccinated.
- This year, for the first time the campaign is being conducted across all the districts in the country and includes children up to 5 years of age (Previous campaigns included children up to 2 years of age).
- Government of India is committed to achieving the target of Measles-Rubella Elimination (MR Elimination) by December 2023 and the Intensified Mission Indradhanush 5.0 program is a major step toward achieving this goal. ([India's plan to eradicate measles, rubella](#))
- Every state/ UT, has been given a target of 95% for both MR doses (MR1, MR2) and 2 per lac population for Non Measles Non Rubella (NMNR) Discard Rate, by GOI.
- Chandigarh has already achieved 103% (MR1), 95% (MR2) and 6 per Lac (NMNR Discard Rate).
- IMI 5.0 is being conducted in three rounds i.e., 7-12 August, 11-16 September, and 9-14 October 2023 i.e., 6 days in a month with the inclusion of a Routine Immunization Day.
- All States/UTs except Bihar, Chhattisgarh, Odisha and Punjab will conclude all three rounds of the IMI 5.0 campaign by 14 October 2023.
- As of 30th September 2023, over 34,69,705 children and 6,55,480 pregnant women were administered vaccine doses during the first 2 rounds of the IMI 5.0 campaign across the country.

Significance:- IMI 5.0 ensures that routine immunization services reach the missed-out and dropped-out children and pregnant women across the country

SOURCE: [PIB](#)

PREVIOUS YEAR QUESTIONS

Q.1) Consider the following statements in the context of interventions being undertaken under the Anaemia Mukta Bharat Strategy: (2023)

1. It provides prophylactic calcium supplementation for preschool children, adolescents and pregnant women.
2. It runs a campaign for delayed cord clamping at the time of childbirth.
3. It provides for periodic deworming, to children and adolescents.
4. It addresses non-nutritional causes of anaemia in endemic pockets with a special focus on malaria, hemoglobinopathies and fluorosis.

How many of the statements given above are correct?

1. Only one
2. Only two
3. Only three
4. All four

Q.2) 'Wolbachia method' is sometimes talked about with reference to which one of the following? (2023)

1. Controlling the viral diseases spread by mosquitoes
2. Converting crop residues into packing material
3. Producing biodegradable plastics
4. Producing biochar from thermochemical conversion of biomass

Indian Coast Guard (ICG)

Syllabus Prelims –DEFENSE

Context: The Indian Coast Guard (ICG) conducted the 21st National Maritime Search and Rescue Board (NMSAR) meeting recently.

Key highlights of the 21st NMSAR meeting:-

- Date: 12 October 2023.
- Venue: Kolkata.
- The meeting was chaired by Director General Rakesh Pal, ICG in his capacity as Chairman, of the NMSAR Board.
- ICG is the coordinating and executing agency for Maritime Search and Rescue in the Indian Search and Rescue Region.
- NMSAR Board:-
 - It was formed in 2002 and since the Board meeting is being held annually.
 - To discuss policy issues, formulate guidelines/ procedures and consider recommendations for reviewing the National Search and Rescue plan.
- During the meeting, National Search and Rescue (SAR) awards for the year 2022-23 were also presented.
 - The United Kingdom Flag vessel MV Furious was awarded in the merchant vessel category.
 - Indian Fishing Boat New Aparajita from West Bengal was awarded in the fishing boat category.
 - ICG Ship Sujeet & ICG Air Squadron 835 SqN(CG) in Govt owned SAR unit category.
 - Gujarat Maritime Board and INMCC received the award in the ashore unit category.

About the Indian Coast Guard (ICG):-

- Establishment: 1978.
- Ministry: Ministry Of Defence.
- HQ: New Delhi, Delhi
- It was established in August 1978 by the Coast Guard Act, 1978 as an independent armed force of India.
- It is the fourth largest Coast Guard in the world.
- For effective command and control, the Maritime Zones of India are divided into five Coast Guard Regions, namely, North-West, West, East, North-East

and Andaman & Nicobar, with the respective Regional Headquarters located at Gandhinagar, Mumbai, Chennai, Kolkata and Port Blair.

Historical Background:-

- The concept of forming ICG came into being after the 1971 war.
- The blueprint for a multidimensional Coast Guard was conceived by the visionary Rustamji Committee.

Objectives and Functions:-

- To protect our ocean and offshore wealth including oil, fish and minerals.
- To assist mariners in distress and safeguard life and property at sea. ([Indian Coast Guard Ships \(ICGS\)](#))
- To enforce maritime laws with respect to sea, poaching, smuggling and narcotics.
- To preserve marine environment and ecology and protect rare species.
- To collect scientific data and back up the Navy during war.
- To Prevent and Control of Marine Pollution.
- To ensure the safety and Protection of Artificial Islands and Offshore Terminals

SOURCE: [PIB](#)

PREVIOUS YEAR QUESTIONS

Q.1) With reference to Home Guards, consider the following statements: (2023)

1. Home Guards are raised under the Home Guards Act and Rules of the Central Government.
2. The role of the Home Guards is to serve as an auxiliary force to the police in the maintenance of internal security.
3. To prevent infiltration on the international border/ coastal areas, the Border Wing Home Guards Battalions have been raised in some states.

How many of the above statements are correct?

1. Only one
2. Only two
3. All three
4. None

Q.2) Recently, India signed a deal known as 'Action Plan for Prioritization and Implementation of Cooperation Areas in the Nuclear Field' with which of the following countries? (2019)

1. Japan
2. Russia
3. The United Kingdom
4. The United States of America

International Olympic Committee (IOC)

Syllabus Prelims –SPORTS

Context: Prime Minister Shri Narendra Modi will inaugurate the 141st International Olympic Committee (IOC) Session on 14th October 2023.

Background:-

- The 141st International Olympic Committee (IOC) Session, will be held at the Jio World Centre in Mumbai.
- IOC session is being held in India after a gap of about 40 years.
- India is hosting the IOC Session for the second time. ([Mission Olympic Cell](#))

About the International Olympic Committee (IOC):-

- Establishment: 1894.
- HQ: Lausanne, Switzerland.
- Objective: to promote the Olympic movement and uphold the Olympic values, which include friendship, respect, and excellence, globally.
- They are responsible for organizing and managing the Summer and Winter Olympic Games.
- IOC Session discusses and decides on the key activities of the global Olympics movement including:-
 - Adoption or amendment of the Olympic Charter
 - The election of IOC members and office-bearers
 - Election of the host city of the Olympics

Functions:-

- Olympic Games Organization: They select the cities for the Games and ensure smooth operations.
- The IOC chooses which cities will host the Olympic Games.
- The IOC supports and develops sports globally.
- It provides financial assistance and Aid to National Olympic Committees (NOCs).
- The IOC perform such activities in order to assist them with sports development.
- The IOC collaborates with sports organizations to ensure their efficient management.
- It also plays a significant role in the fight against doping in sports, working with organizations like the World Anti-Doping Agency (WADA) to maintain the integrity of Olympic competitions.

MUST READ: [Indian Olympic Association](#)

SOURCE: [PIB](#)

PREVIOUS YEAR QUESTIONS

Q.1) Consider the following statements in respect of the 44th Chess Olympiad, 2022: (2023)

1. It was the first time that the Chess Olympiad was held in India.
2. The official mascot was named Thambi.
3. The trophy for the winning team in the open section is the Vera Menchik Cup.
4. The trophy for the winning team in the women's section is the Hamilton-Russell Cup.

How many of the statements given above are correct?

1. Only one
2. Only two
3. Only three
4. All four

Q.2) Consider the following statements in respect of the Bharat Ratna and Padma Awards. (2021)

1. Bharat Ratna and Padma Awards are titled under Article 18(1) of the Constitution of India.
2. Padma Awards, which were instituted in the year 1954, were suspended only once.
3. The number of Bharat Ratna Awards is restricted to a maximum of five in a particular year.

Which of the above statements is not correct?

1. 1 and 2 only
2. 2 and 3 only
3. 1 and 3 only
4. 1, 2 and 3

Methane emission

Syllabus Prelims –ENVIRONMENT AND ECOLOGY

Context: A recent study states that cutting down on Methane emission by Targeted methane mitigation can avoid 0.1°C warming in 2050.

Key Highlights of the report:-

- The report was released jointly by the International Energy Agency, the United Nations Environment Programme (UNEP) and the UNEP-convened Climate and Clean Air Coalition.
- Around 580 million tonnes (Mt) of methane is emitted every year globally, 60 per cent of which comes from human activities, according to the latest assessment.
- Under current trajectories, total anthropogenic methane emissions could rise by up to 13 per cent between 2020 and 2030.

- The report called for rapid cuts in methane emissions from fossil fuels as it will prevent global warming to an extent greater than the emissions impact of immediately taking all cars and trucks in the world off the road.
- It urged that methane abatement measures should be above and beyond the decarbonization efforts for the energy sector.
- Without targeted action on methane, even with deep reductions in fossil fuel use, the increase in the global average surface temperature will likely exceed 1.6°C by 2050.
- The fossil fuel sector likely holds the largest potential for rapid and low-cost reductions in methane emissions.
- More than 80 Mt of annual methane emissions from fossil fuels can be avoided by 2030 using existing technologies, often at low – or even negative – costs.
- Around \$75 billion is required by 2030 for all methane abatement measures in the oil and gas sector in the Net Zero scenario, according to the findings. "This is equivalent to less than 2 per cent of the income generated by the oil and gas industry in 2022,".
- Controlling methane emissions will also provide health benefits and enhance food security.

About Methane Emission:-

- Methane (CH₄) is the simplest hydrocarbon, consisting of one carbon atom and four hydrogen atoms.
- It is a colorless, odorless, and highly flammable gas, and the main component in natural gas.
- It is such a potent heat absorber.
- It is the primary component of natural gas.
- It is a powerful greenhouse gas.
- It warms the planet more than 80 times as quickly as a comparable volume of atmospheric CO₂ over a comparable amount of time.
- It is estimated to have been responsible for 30 per cent of global warming since the Industrial Revolution.
- Methane pollution, which is a primary component of ground-level ozone.
- It has been linked to heart disease, birth defects, asthma and other adverse health impacts.

Sources of Methane:-

- Biological Sources: it is made from some organic compounds by methane-generating microbes known as
- Agriculture: Livestock emissions from manure and gastroenteric releases account for roughly 32% of human-caused [methane emissions](#).
 - Cows also belch out methane.
- Emissions from Fuel and Industries.

Initiatives to reduce methane emission:-

- COP 26 Pledges: At COP26 in Glasgow, over 100 countries signed an agreement to cut methane emissions by 30% by 2030 as methane might be easier to deal with than carbon dioxide.
- MethaneSAT: a planned American-New Zealand space mission scheduled for launch later in 2022.
 - It will be an Earth observation satellite that will monitor and study global methane emissions in order to combat climate change.
- UN Initiatives: The UN Food Systems Summit in September 2021 was also aimed at helping make farming and food production more environmentally friendly.
- India's Initiative: Central Salt & Marine Chemical Research Institute (CSMCRI) in collaboration with the country's three leading institutes developed a seaweed-based animal feed additive formulation that aims to reduce methane emissions from cattle.

SOURCE: [DOWN TO EARTH](#)

PREVIOUS YEAR QUESTIONS

Q.1) "Climate Action Tracker" which monitors the emission reduction pledges of different countries is a: (2022)

1. Database created by a coalition of research organizations
2. Wing of "International Panel of Climate Change"
3. Committee under "United Nations Framework Convention on Climate Change"
4. Agency promoted and financed by the United Nations Environment Programme and World Bank

Q.2)) In the Indian context, what is the implication of ratifying the 'Additional Protocol' with the 'International Atomic Energy Agency (IAEA)'? (2018)

1. Civilian nuclear reactors come under IAEA safeguards.
2. The military nuclear installations come under the inspection of the IAEA
3. The country will have the privilege to buy uranium from the Nuclear Suppliers Group (NSG).
4. The country automatically becomes a member of the NSG.

Asteroid Bennu

Syllabus Prelims –SCIENCE AND TECHNOLOGY

Context: Recent reports show that the samples collected from the 4.5-billion-year-old asteroid Bennu could indicate the building blocks of life on Earth.

Background:-

- The sample return capsule from NASA's OSIRIS-REx mission is seen shortly after touching down in Utah, on September 24, 2023.
- The sample was collected from the asteroid Bennu in October 2020. ([NASA's OSIRIS-REx](#))

About Asteroid Bennu:-

- Discovered: 1999.
- Discovered by: NASA.
- The asteroid was discovered by a team from the NASA-funded Lincoln Near-Earth Asteroid Research team in 1999.
- It was originally named as 1999 RQ36.
- The name Bennu comes from an Egyptian deity related to the Sun, often depicted as a grey heron.
- It is a 500-meter-wide asteroid in an elliptical orbit around the sun.
- It is currently more than 200 million miles from Earth.
- Bennu's orbit is close in proximity to Earth's, even crossing it.

- The asteroid makes its closest approach to Earth every 6 years.
- It is one of the most potentially hazardous asteroids currently known to Earth.
- It has a 1-in-2,700 chance of impacting Earth during one of its close approaches to Earth in the late 22nd century.
- OSIRIS-REx – short for Origins-Spectral Interpretation-Resource Identification-Security-Regolith Explorer was the first U.S. mission to collect a sample from an asteroid.

About OSIRIS-Rex:-

- Launched on: Sept. 8, 2016.
- Launched by: NASA.
- OSIRIS-REx – short for Origins-Spectral Interpretation-Resource Identification-Security-Regolith Explorer.
- It was the first U.S. mission to collect a sample from an asteroid.
- The OSIRIS-REx mission is essentially a seven-year-long voyage.
- It was meant to explore [asteroid Bennu](#).
- The spacecraft contains five instruments including cameras, a spectrometer, and a laser altimeter.
- The spacecraft arrived at Bennu in December 2018.
- It Surveyed the asteroid for more than two years.
 - Bennu is an ancient asteroid, currently more than 200 million miles from Earth.
 - The asteroid was discovered by a team from the NASA-funded Lincoln Near-Earth Asteroid Research team in 1999.
- It offers scientists a window into the early solar system as it was first taking shape billions of years ago and tossing ingredients that could have helped seed life on Earth.
- On 20, 2020, the spacecraft collected a sample from the asteroid and stowed it in its sample return capsule.
- The pristine material from Bennu – rocks and dust collected from the asteroid's surface will offer generations of scientists a window into the time when the Sun and planets were forming about 4.5 billion years ago.

SOURCE: [DOWN TO EARTH](#)

PREVIOUS YEAR QUESTIONS

Q.1) Which one of the following statements best reflects the idea behind the "Fractional Orbital Bombardment System" often talked about in media? (2022)

1. A hypersonic missile is launched into space to counter the asteroid approaching the Earth and explode it in space.
2. A spacecraft lands on another planet after making several orbital motions.
3. A missile is put into a stable orbit around the Earth and deorbits over a target on the Earth.
4. A spacecraft moves along a comet with the same surface. speed and places a probe on its

Q.2) With reference to India's satellite launch vehicles, consider the following statements: (2018)

1. PSLVs launch satellites useful for Earth resources monitoring whereas GSLVs are designed mainly to launch communication satellites.
2. Satellites launched by PSLV appear to remain permanently fixed in the same position in the sky, as viewed from a particular location on Earth.
3. GSLV Mk III is a four-stage launch vehicle with the first and third stages using solid rocket motors, and the second and fourth stages using liquid rocket engines.

Which of the statements given above is/are correct?

1. 1 only
2. 2 and 3
3. 1 and 2
4. 3 only

Central Information Commission (CIC)

Syllabus Prelims –POLITY

Context: Recently, the Central Information Commission (CIC) commemorated the 18th anniversary of the enactment of the RTI Act.

About Central Information Commission (CIC):-

- Establishment: 2005.
- The CIC was constituted in 2005 under the [Right to Information Act, 2005](#).
- The RTI Act 2005 provides for the constitution of a Central Information Commission and State Information Commissions in each state.
- Jurisdiction: the Commission extends over all Central Public Authorities.
- The Right to Information (Amendment) Act, of 2019 amended the Right to Information Act, of 2005.
- The RTI Act, of 2005 specified the tenure, terms of service, and salaries of the Chief Information Commissioner (CIC) and Information Commissioners (ICs) at the central and state levels, in the parent law.

Structure:-

- The Central Information Commission shall consist of:
- The Chief Information Commissioner (CIC).
- Members: Such numbers of Central Information Commissioners (ICs), not exceeding ten, as may be deemed necessary.
- The members shall be persons of eminence in public life with wide knowledge and experience in law, science and technology, social service, management, journalism, mass media or administration and Governance.
- The CIC or IC shall not be an MP or MLA or hold any other office of profit connected with any political party carrying on any business or pursuing any profession.
- Appointment: The members of the commission are appointed by a committee consisting of the PM (as Chair), the Leader of Opposition (LoP) in Lok Sabha and a Union Cabinet Minister appointed by the Prime Minister.
- Tenure: The CIC and ICs (at the central and state level) will hold office for a term of three years.
- Resignation: The CIC or an IC may, at any time, by writing under his hand addressed to the President, resign from his office.
- Removal: The CIC or an IC may be removed from office only by order of the President on the grounds of proven misbehaviour or incapacity after the Supreme Court, on a reference made to it by the President, reports that he/she should be removed on the grounds mentioned.
 - The President may also remove them from office if such a person is adjudged insolvent, convicted for certain offences etc.
 - They are not eligible for reappointment.

Power and Functions:-

- To receive and inquire into a complaint from any person regarding information requested under the RTI act.
- It can order an inquiry into any matter if there are reasonable grounds (suo-moto power).
- While inquiring, the Commission has the powers of a civil court in respect of summoning, requiring documents, etc.
- Adjudication in the second appeal for giving information;
- Direction for record-keeping
- Imposition of penalties and Monitoring and Reporting including preparation of an Annual

SOURCE: [PIB](#)

PREVIOUS YEAR QUESTIONS

Q.1) If a particular area is brought under the Fifth Schedule of the Constitution of India, which one of the following statements best reflects the consequence of it? (2022)

1. This would prevent the transfer of land from tribal people to non-tribal people.
2. This would create a local self-governing body in that area.
3. This would convert that area into a Union Territory.
4. The State having such areas would be declared a Special Category State.

Q.2) With reference to India, consider the following statements (2021)

1. Judicial custody means an accused is in the custody of the concerned magistrate and such accused is locked up in a police station, not in jail.
2. During judicial custody, the police officer in charge of the case is not allowed to interrogate the suspect without the approval of the court.

Which of the statements given above is/are correct?

1. 1 only
2. 2 only
3. Both 1 and 2
4. Neither 1 nor 2

National Human Rights Commission

Syllabus Prelims –POLITY

Context: The National Human Rights Commission celebrated its 30th Foundation Day recently.

About the National Human Rights Commission:-

- Established: 1993.
- HQ: New Delhi.
- NHRC is a statutory body established under the Protection of Human Rights Act (PHRA), 1993.
- The Act also provides for the creation of the State Human Rights Commission (SHRC) as well.

1. Only one
2. Only two
3. Only three
4. All four

Q.2) Consider the following statements: (2023)

Historical Background:-

- NHRC was established in conformity with the Paris Principles.
- Paris Principles: adopted for the promotion and protection of human rights in Paris in 1991. It was endorsed by the General Assembly of the United Nations in 1993.

- The Self-Help Group (SHG) programme was originally initiated by the State Bank of India by providing microcredit to the financially deprived.
- In an SHG, all members of a group take responsibility for a loan that an individual member takes.
- The Regional Rural Banks and Scheduled Commercial Banks support SHGs.

Composition of NHRC:-

- It is a multi-member body. (NHRC)
- It consists of a chairperson, five full-time Members, and seven deemed Members.
- Chairperson: a retired chief justice of India or a judge of the Supreme Court.
- Appointments:-
- The chairman and members are appointed by the President on the recommendations of a six-member committee consisting of:-
 - Prime Minister (head)
 - Speaker of the Lok Sabha
 - Deputy Chairman of the Rajya Sabha
 - Leaders of the Opposition in both Houses of Parliament
 - Union Home Minister.
- Term: three years or until they attain the age of 70 years, whichever is earlier.
- Removal: The president can remove them from office under specific circumstances.
- They can be removed only on the charges of proven misbehaviour or incapacity if proved by an inquiry conducted by a Supreme Court Judge.

How many of the above statements are correct?

1. Only one
2. Only two
3. All three
4. None

United Nations Security Council (UNSC) reforms

Syllabus Mains – GS 2 (International relations) Context: The longstanding debate on fundamental reforms at the United Nations (UN) has resurfaced once again, more than thirty years after it first began.

About United Nations Security Council (UNSC):

Functions of NHRC:-

- To investigate the violation of human rights.
- To prevent a human rights violation.
- To conduct research about human rights.
- To create awareness campaigns through various mediums, and encourage the work of non-governmental organizations (NGOs).
- NGO: a group that functions independently of any government.
- It is the watchdog of human rights in the country.

SOURCE: AIR



Q.1) Consider the following organizations/ bodies in India: (2023)

1. The National Commission for Backward Classes
2. The National Human Rights Commission
3. The National Law Commission
4. The National Consumer Disputes Redressal Commission

- It is one of the UN's six main organs and is aimed at maintaining international peace and security.
- EST: 1945
- HQ: New York City.
- Membership: The Council is composed of 15 Members including 10 non-permanent members.
- P5 with veto power: China, France, Russia, the United Kingdom and the United States.

How many of the above are constitutional bodies?

UNSC elections:

- Each year the General Assembly elects five non-permanent members (out of 10 in total) for a two-year term.
- The 10 non-permanent seats are distributed on a regional basis as follows:
 - Five for African and Asian States.
 - One for the Eastern European States.
 - Two for the Latin American and Caribbean States;
 - Two for Western European and other States
- To be elected to the Council, candidate countries need a two-thirds majority of ballots of the Member States that are present and voting in the Assembly.
- The UNSC elections were traditionally held in the General Assembly hall with each of the 193 member states casting its vote in a secret ballot.

- The decentralization of the UNSC's decision-making processes will enable its transformation to a more representative, participatory body.
- India and UNSC: India as the current one of the non-permanent members of the UNSC can start by drafting a resolution containing a comprehensive set of proposals for reforming the UNSC.
 - India urged for UNSC reform hosting a meeting of two separate groupings G-4 and L-69 in New York on the sidelines of the UN General Assembly in September 2022.

Source: [TH](#)

Need for United Nations Reforms:

- Inadequate Council Representation: Presently, with 193 UN member-states, only 15 Council members exist, accounting for less than 8%.
 - Consequently, a significant number of nations do not feel fairly represented within the Council.
- Imbalanced Powers and privileges: The current privilege enjoyed by the five permanent members and based on historical precedence is politically untenable.
 - Europe, comprising just 5% of the global population, controls 33% of Council seats, not including Russia, another European power.
- Financial Disparities: Some countries contribute more financially to the UN than four of the five permanent members.
 - For example, Japan and Germany have consistently ranked as the second and third largest UN budget contributors.
- Unresolved conflicts: Conflicts in regions like Sudan, Syria, Afghanistan, Palestine and Myanmar often remain unaddressed, allowing certain countries and non-state actors to exploit these situations economically.
- Failure in basic functions: The Security Council struggles to fulfill its fundamental role, especially when a permanent member attacks its neighbour.
 - For example, when Russia attacked Ukraine in February 2022, its veto power obstructed UNSC resolutions addressing the situation.
- Denied Opportunities for Contributions and Representation: Prominent nations like India, with significant population, economic influence, and substantial contributions to the UN, find their opportunities curtailed.
 - Despite their active roles in shaping global affairs, these states remain underrepresented, highlighting the pressing need for reforms within the UN framework.

Way Forward: Suggestive measures

- Expansion of UNSC: The changing needs of global governance for peace and security require significant reforms in the UNSC, including expanding its permanent and non-permanent seats to better address the complex and evolving challenges to international peace and security.
- Democratization: The power imbalance between the P5 and other countries in the UNSC needs to be addressed urgently to make the council more democratic and increase its legitimacy in governing international peace, security and order.
- Equitable Representation: Equitable representation of all the regions in the UNSC is critical to decentralizing its governing power and authority over nations.

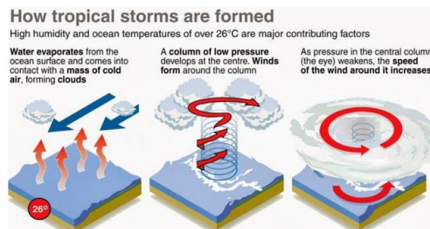
Changing Landscape of Cyclone Formation

Syllabus Mains – GS 1 (Geography) Context: A study just published in the journal Climate and Atmospheric Science reported a sharp change in the potential for cyclones to form over the Arabian Sea during the late 1990s.

- Climate scientists employ a range of terms to describe observed changes in climate variables. These include;
- Trend: A trend implies that a climate variable is consistently changing in one direction, such as a continuous increase in temperature.
 - The term "anthropogenic trend" suggests that these changes are occurring within human lifetimes, although the specific timeframe for a variable to be considered a trend is not always clear.
- Secular Trend: This term is used when a variable has been increasing or decreasing for a certain period within a longer timeframe.
 - For instance, a variable may exhibit a secular trend if it has been steadily increasing for 30 years within a 100-year period.
- Decadal Variability: Decadal variability refers to oscillations from a positive to a negative phase that occur over the span of decades.
 - It is somewhat similar to the concept of a shift, but decadal variability is often cyclic in nature.
- Shift: A shift represents a rapid transition from one state to another, such as a sudden change in the amount of rainfall or temperature.
 - It can be an irreversible jump or a temporary change that later reverts to a previous state.

About [Cyclones](#):

- The word Cyclone is derived from the Greek word Cyclos meaning the coils of a snake.
- It was coined by Henry Peddington because the tropical storms in the Bay of Bengal and the Arabian Sea appear like coiled serpents of the sea.
- They are caused by atmospheric disturbances around a low-pressure area distinguished by swift and often destructive air circulation.
- They are usually accompanied by violent storms and bad weather.
- The air circulates inward in an anticlockwise direction in the Northern hemisphere and clockwise in the Southern hemisphere.



Highlights of Recent study:

- Climate scientists are examining whether observed changes in climate variables, such as decreasing monsoon rainfall, increasing extreme rainfall, droughts, heatwaves, and cyclones, are trends, shifts, or decadal cycles.
 - These distinctions are important for how we plan for resources, such as water, crops, and energy.
- A new study suggests a shift in the Arabian Sea's cyclogenesis potential, which may be linked to a shift in the Warm Arctic, Cold Eurasian pattern. Global warming and regime shifts may also be involved.
- To better understand climate risks and plan for adaptation, scientists must investigate natural variability and how it is modulated by global warming.

Impacts of Climate Change on Cyclone Formation:

- Augmented Precipitation:** A warmer atmosphere can accommodate a greater amount of moisture, resulting in increased rainfall.
 - More rainfall leads to the release of more heat, ultimately fuelling stronger winds within the cyclone.
 - Recent studies have revealed that hurricane rainfall rates rise by at least 7% for every degree of warming.
- Intensification of Cyclones:** A warming climate is anticipated to boost wind speeds, leading to a higher proportion of storms intensifying into formidable Category 4 or 5 hurricanes/ Cyclones.
- Temperature Elevation:** The temperature of both the ocean and the atmosphere plays a pivotal role in the genesis of tropical cyclones.
 - cyclonic storms draw strength from the release of heat generated when ocean surface water evaporates and subsequently condenses into rainfall within the storm.
 - In a warming climate, a warmer ocean leads to increased evaporation, which, in turn, means more moisture available in the atmosphere.
- Sea-Level Surge:** Elevated temperatures contribute to rising sea levels, increasing the depth of stormwater.
 - As sea levels rise, the storm's inundation reaches further inland.
- Reduced Storm Speed:** The velocity of a cyclone can significantly impact the total amount of rainfall at a particular location.
 - Slower-moving storms offer a more extended timeframe for rainfall accumulation.
 - Although studies indicate a slowdown in storm speed, the underlying mechanisms remain unclear.
- Fusion of Storms:** In an increasingly warming world, the convergence of two sizable tropical storms over any of the world's oceans could result in the formation of a colossal super-cyclone.

Implications of changing landscape of cyclones and its impacts:

- Increased destructions:** More powerful storms can inflict significantly greater harm to both people and economies.
 - The eastern part of India and Bangladesh were struck by Cyclone Amphan in May of 2020.
 - The storm killed 98 people in India, and required the evacuation of more than 5,00,000 people from Bengal and Odisha.
- Unpredictable Predictions:** The rapidly evolving nature of storms has rendered conventional forecasting methods unreliable.
 - This unpredictability has had a direct impact on the ability to take adequate precautionary measures.
- Rising Storm Frequency:** The number of hurricanes forming each year may undergo alterations in the future.
 - However, there is no universally accepted theory that comprehensively explains the current quantity of storms in the existing climate or forecasts how this might change in the future.
- Shifting Impact Zones:** Recent research suggests that the areas where storms reach their maximum intensity are gradually shifting toward the Earth's poles.
 - This shift holds significant implications for the primary areas affected by these storms.
 - In 2021, Gujarat was faced with Cyclone Tauktae, the deadliest cyclone to hit the Arabian Sea in a decade.
 - Reports said that the tempestuous winds and rain killed approximately 70 people and more than 8,000 cattle, and damaged as many as 88,000 homes. 2,80,000 people were evacuated from the coastal areas.

Way Forward:

Therefore the study highlighting the shift in cyclone-genesis potential over the Arabian Sea in the late 1990s serves as a compelling example of the complex interplay between climate patterns and regional climate phenomena. It underscores the importance of distinguishing between trends, shifts, and decadal cycles in climate research and their impact on resource planning and climate adaptation.

Source: [TH](#)